



NOISE INDUCED HEARING LOSS AMONG INDUSTRIAL WORKERS OF SOUTH PUNJAB, PAKISTAN.

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ABSTRACT... Objectives: Occupational noise induced hearing loss (ONIH) is considered an important reason responsible for disability around the world. As industrial workers are frequently exposed to occupational noise, sensorineural hearing loss (SNIHL) is commonly found in this set of population. This study was conducted to determine the frequency of noise induced hearing loss (NIHL) in industrial workers of Multan. **Study Design:** Descriptive, cross-sectional study. **Setting:** Department of Otorhinolaryngology, Nishtar Hospital, Multan. **Period:** 16th April 2018 to 15th October 2018. **Material & Methods:** A total of 316 industrial workers of age 25-65 years and both genders were included. Audiometric testing was performed in a sound free room where calibrated digital audiometer ALPS AD 2100 was used. Hearing threshold was obtained for both ears at 250-8 kHz. NIHL was noted. **Results:** Mean age was 45.56 ± 10.95 years. Most patients, 170 (53.80%) were 25-45 years of age. There were 188 (59.49%) male and 128 (40.51%) female. Mean duration of experience was 11.14 ± 5.86 years. NIHL was found in 95 (30.06%) patients. **Conclusion:** Frequency of NIHL among industrial workers is high. Factory owners and workers should consider adopting preventive and safety measures to control noise induced hearing loss.

Key words: Hearing Loss, Industrial Workers, Noise Induced.

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INTRODUCTION

Occupational health is considered to a major concern for workers around the world. Disproportionate occupational experience to noise has been seen to contribute to hearing disorders. An active and healthy worker is imperative for social as well as economic growth of a society. There are many factors thought to influence disease process in occupational workers whereas noise is considered one of the most important one.¹

Noise pollution in the recent decades has come out as a hovering threat to the modern world.² Considering, technology has fetched innumerable benefits, some of the drawbacks include interference with quality of life. The rapid development has resulted in noise and it is considered to be a contributing factor linked to hearing loss among humans.³ Without proper protection, frequent, serious and permanent hearing loss are feared amongst those workers

who are exposed too much to noise.⁴

The researchers have stated a tolerable noise limit as 85dBA in the working environment of 8 hours work but hazard of hearing loss differ from individual to individual. As soon as the workers are exposed to 80dBA on consistent basis, measures should be taken to avoid such circumstances.⁵

Amongst industrial workers, Regis et al⁴ reported prevalence of hearing loss and suggestive NIHL as 44.2% and 28.9% respectively. ONIH is an important cause of SNIHL in those industrial workers who have continuous exposure to high frequency noise.⁶

Exposure to more than 85 dB sound has been found to pose temporary hearing loss or dullness described as temporary threshold shift (TTS). TTS has been noted to resolve in 10 to 15 days whereas a continuous exposure to noise to hair cells and linked nerve fibers may go on to

progress to degenerative alterations which may go on to develop in to permanent threshold shift (PTS).⁷

The purpose of our study was to determine current magnitude of the problem in these factory workers. There are few studies on this topic available from Pakistan which were done in Islamabad and Karachi. These studies were done with smaller sample size of 50⁸, 50⁹ and 248¹.

We had planned this study to get more authentic and acceptable information from our local population of Southern Punjab. The aim was to determine the frequency of noise induced hearing loss in industrial workers of Multan. The findings were to be compared with those reported from other parts of the world and to formulate guidelines regarding noise control and safety of such workers.

MATERIAL & METHODS

This was a descriptive, cross-sectional study, conducted at the department of otorhinolaryngology, Nishtar Hospital, Multan, from 16th April 2018 to 15th October 2018.

A sample of 316, using formula $n = Z^2P(1-P) / d^2$, taking $z = 1.96$, $p = 28.89\%$,⁴ and $d = 5\%$. Non-probability, Consecutive sampling technique was employed. All the participants were industrial workers (as per-operational definition) visiting for their routine follow up, having history of working in noisy conditions for more than 3 years., aged 25-65 years of both genders. Industrial workers were those workers who were working in the noisy environmental conditions of the industries (such as weaving, spinning and stone crushing factories) while working minimum 8 hours a day in such environment as revealed by the workers which are attendants of different patients coming to our OPD. Patients with chronic suppurative otitis media, or with wax (on examination) or with sinusitis (on history and examination) were not enrolled.

Approval from institutional ethical and research committee was acquired and informed consent was taken from all the study participants.

Audiometric testing was conducted in a sound free room in the office and calibrated digital audiometer ALPS AD 2100 was used. Hearing threshold was taken for both ears at 250-8 kHz and a threshold more than 35 dB was taken as hearing loss. NIHL was noted in the proforma. All the relevant information like age, gender, duration of experience, overtime working, history of DM and hypertension was taken and noted in the study proforma. All the data was recorded on the specially designed proforma.

Statistical analysis was performed using SPSS version 20.0. Mean and standard deviation was calculated for age, duration of duty hours and duration of experience. Frequency and percentage was calculated for gender, age groups, hypertension (yes/no), diabetes mellitus (yes/no), overtime working (yes/no), literacy and noise induced hearing loss (yes/no). Effect modifiers like age, gender, duration of experience, hypertension (yes/no), diabetes mellitus (yes/no), overtime working (yes/no) and literacy were controlled through stratifications. Post-stratification Chi square was applied to see their effects on the outcome and p value ≤ 0.05 was considered as significant.

RESULTS

Age range was 25 to 65 years with mean age of 45.56 ± 10.95 years. Majority of the patients 170 (53.80%) were between 25 to 45 years of age. There were 188 (59.49%) male and 128 (40.51%) females with male to female ratio of 1.5:1. Mean duration of experience was 11.14 ± 5.86 years. Mean duration of duty hours was 14.61 ± 4.71 hours.

Noise induced hearing loss in industrial workers was found in 95 (30.06%) patients, whereas there was no noise induced hearing loss in 221 (79.94%) patients as shown in Figure-1.

When stratification of noise induced hearing loss was done on age groups, gender, literacy, duration of experience and presence of hypertension and diabetes mellitus, no statistical significance (p value > 0.05) was found as shown in Table-I.

Study Variables		Noise Induced Hearing Loss		P-Value
		Yes (n=95)	No (n=221)	
Age	25-45 years	49	121	0.604
	46-65 years	46	100	
Gender	Male	57	131	0.904
	Female	38	90	
Duration of Experience	≤ 10 years	46	113	0.659
	> 10 years	49	108	
Hypertension	Yes	39	92	0.924
	No	56	129	
Diabetes Mellitus	Yes	29	59	0.486
	No	66	162	
Overtime Working	Yes	63	138	0.512
	No	32	83	
Literacy	Illiterate	37	98	0.374
	Literate	58	123	

Table-I. NIHL with respect to study variables

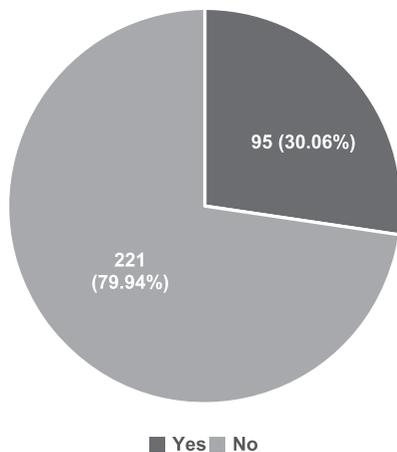


Figure-1. Frequency of NIHL Among industrial workers (n=316)

DISCUSSION

NIHL is thought to represent full loss of hearing but the progression to this stage takes months to years. NIHL is considered to be the 2nd commonest type of acquired hearing loss.¹⁰ NIHL is usually bilateral and symmetrical and affect higher frequencies (3k, 4k or 6k Hz) and then it spreads to low frequencies (0.5k, 1k or 2k Hz).¹¹ Hearing is usually impaired at higher frequencies at first, then interferes with day to day activities. Symptoms of NIHL included problem in routine conversations (especially on phone), using high

volumes of tv/radio.¹² Noise pollution also cause irritability, loss of concentration, tiredness and sleep disorders.

In the present study, age range was 25-65 years with mean age of 45.56±10.95 years. Most patients, 170 (53.80%) were between 25 to 45 years of age and male 188 (59.49%). Noise induced hearing loss in industrial workers was found in 95 (30.06%) patients. Amongst industrial workers, Regis et al⁴ reported prevalence of hearing loss and suggestive NIHL as 44.2% and 28.9% respectively.

A study conducted on traffic policemen from India revealed 76% NIHL whereas job duration of more than 5 years was associated with some sort of hearing loss.¹³ The National institute of miners' health (NIMH) have conducted few studies regarding NIHL in different mines, revealing 12% prevalence of NIHL.¹⁴ Another study from Salvador reported 46% industrial workers to have NIHL.¹⁵

A study done on marble workers showed that 48% of them had some sort of NIHL.¹⁶ A study done on metallurgical industry workers revealed that 22% of them had NIHL.¹⁷ The difference in frequency in the mentioned studies could be

because of different characteristics like work duration and use of protection equipment of study participants.¹⁸ It has been found earlier that relation exist between PTS and noise exposure among workers while long term exposure worsen the situation.^{19,20}

A study from Kenya among weaving workers revealed that 60% of them had NIHL.²¹ Weavers have been more prone to hearing disorders as it was shown in an Ethiopian research as well that 71% of weavers workers were having NIHL.²² Figures as high as 85% of weavers having NIHL have been seen from Lagos.²³ A study from Jordan among workers having exposure to high levels of noise revealed 30% them had NIHL while the researchers noted 8% NIHL amongst the general population.²⁴

Mean duration of duty hours was 14.61 ± 4.71 hours in the present study. A study done in weaving department from Kenya noted mean daily working time as 7.67 hours which is way lesser than us.²¹ International Standard Organization recommends 8 hours working / day (40 hours per week) but we noted much higher working time in the present study.

More research is needed to assess the preventive aspects at high noise environments. Usage of ear protection as well as regular audiometric examinations must be done at noise prone facilities.

CONCLUSION

Frequency of NIHL among industrial workers is high. Factory owners and workers should consider adopting preventive and safety measures to control noise induced hearing loss.

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